DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES

CALIFORNIA INSTITUTE OF TECHNOLOGY

PASADENA, CALIFORNIA 91125

A TECHNIQUE FOR ESTIMATING LEGISLATORS' IDEAL POINTS ON CONCRETE POLICY DIMENSIONS

Keith Krehbiel

SOCIAL SCIENCE WORKING PAPER 543

September 1984

A TECHNIQUE FOR ESTIMATING LEGISLATORS' IDEAL POINTS

ON CONCRETE POLICY DIMENSIONS

Keith Krehbiel
California Institute of Technology

The increasing availability and use of congressional roll call data and of interest groups' ratings of congressmen has resulted in a steady stream of studies that contribute to our understanding individual members' voting decisions.[1] Furthermore, building onto earlier findings, more recent studies have synthesized ostensibly competing models into eclectic, improved accounts of voting decisions (Kingdon, 1977). A lingering puzzle, however, is that few empirical studies make the seemingly natural transition from the individual level, at which voting decisions are predicted, to the aggregate level, at which congressional outcomes are predicted. The basis for the refusal or reluctance to study congressional outcomes cannot be an absence of theory, since theories of committee decision-making are among the oldest in our discipline (Black and Newing, 1951; Black, 1958), and since recent extensions are increasingly motivated by an interest in congressional decision-making, first by standing committees and then by members of the parent body (Shepsle, 1979; Denzau and Mackay, 1983; Krehbiel, 1983). What, then, precludes empirical tests of theories of aggregate congressional outcomes?

This study is predicated by a diagnosis of the problem not as undeveloped theory nor as unavailable data, but rather as the absence of a useful technique for considering theory and data jointly. Formal theories as well as informal accounts of congressional decision-making typically assume that congressmen have policy preferences that play an important part in individual votes and aggregate outcomes. Although many studies use roll call votes and interest groups' ratings of members as proxies for preferences, and although several studies actually locate different members on different points of some underlying continuum, the practical meaning of such ratings, scores, and continua remains vague, if not suspect (Fowler, 1982). To illustrate, suppose that two relatively liberal MCs — X and Y — have ADA scores of 70 and 90, respectively. Even if the difference in scores is sufficiently large to justify the statement "Y is more liberal than X," this information is minimally useful for prediction. Were the Congress to consider a proposal to spend some specified moderate amount of money on a social program, the scores do not tell us which if either member will vote for it. And the scores offer even less assistance in predicting the congressional outcome, that is, the actual amount of expenditure approved by a requisite congressional majority.

The key problem is that the metric of the scores differs from the metric(s) of actual congressional proposals. Abstract scores (however they may be derived) cannot be placed on concrete dimensions such as dollars, nor can concrete proposals be assigned values that correspond to the units of abstract scores. The proposed solution to this problem is a simple, easily employable technique that permits the mapping of abstract scores onto a concrete policy dimension. In the first section, the assumptions of the technique are discussed and their underlying rationale is exposed with a hypothetical example. The second section is a demonstration using actual congressional data. The final section is a discussion of problems one might confront in future applications.

I. THE TECHNIQUE

Estimation and inference cannot occur without a maintained model. Accordingly, an initial challenge is to shun the trap of embedding in the maintained model assumptions that subsequently may be put to a test. Although the principal concern is to devise a way to test theories about congressional outcomes, most such theories explicitly build upon assumptions about individual choice. Thus to make strict assumptions about individual choice or to make vague assertions about how institutions generate outcomes would be to risk assuming the results of potential tests. The problem is a difficult one and the proposed solution -- like most solutions to difficult problems -- may be less than ideal. It is defensible, however, on the grounds that it is intuitively plausible and a reasonable starting point.

The objective is to project abstract scores of congressmen onto a concrete dimension whose values correspond with values of proposals on which congressmen decide.[2] For each congressman an unobserved ideal point is estimated as a specified function of an observed score.

Estimation is made possible by exploiting roll call votes on, and quantitative content of, two or more proposals, and by invoking two assumptions. The first assumption escapes dubious individual-level determinism (e.g., "All members vote for the alternative closest to their ideal point.") by focusing instead on average scores of members in the coalition that supports a given proposal. The second assumption posits a linear relationship between observed scores and unobserved ideal points.

> <u>Assumption 1</u>. Given a recorded roll call vote on a proposal that possesses a known value on a concrete dimension, we assume that the average score of the members who vote "yea" on the proposal corresponds to an unobservable ideal point equal to the value of the proposal. The relationship can be represented as an ordered pair of values called an <u>anchor</u>, which can be represented as a point in a two-dimensional space.

We adopt these formalizations:

x_i is an actual (unobserved) ideal point of member i, and takes on values comparable to the issue under consideration,

$\tilde{x}_i$ is an estimate of x_i,

s_i is an abstract score for member i,

θ_j is the concrete value of the jth proposal put to a vote,

Y_j is the set of members who vote yea on θ_j,

$\bar{s}(Y_j)$ is the average score of members who vote yea on θ_j, i.e., $\frac{1}{|Y_j|} \sum_{i \varepsilon Y_j} s_i$, and

A_j is an anchor for proposal θ_j.

Thus, it follows from assumption 1 that an anchor, A_j, for proposal, θ_j, equals $(\bar{s}(Y_j),\theta_j)$.

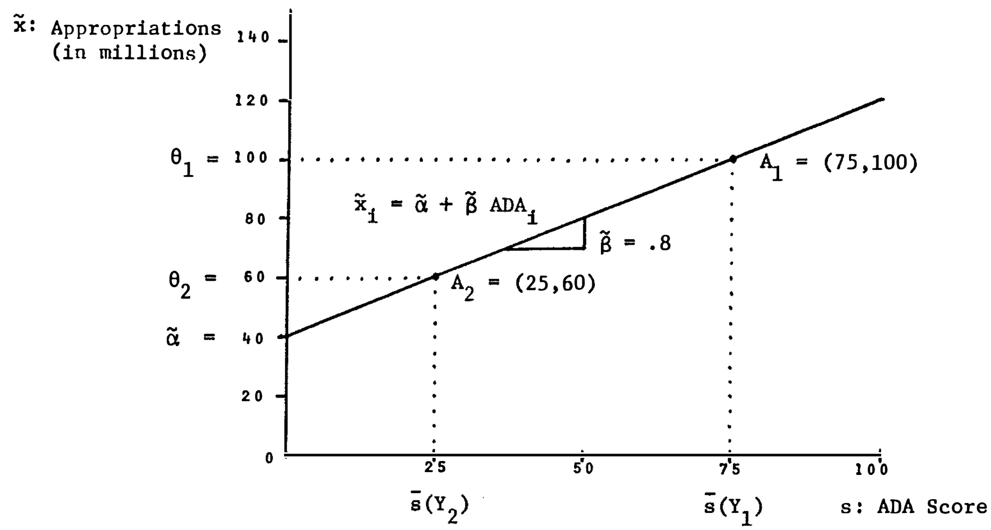
<u>Assumption 2</u>. Ideal points are linear functions of scores. Formally, $x_i = \alpha + \beta s_i$, where α and β are parameters to be computed or estimated from anchors.

The technique requires at least two roll call votes on proposals with values on the same concrete dimension. Consider decision-making on the Senate floor on appropriations for a social program. Suppose a bill states that $70 million shall be appropriated for the program. Liberals regard the amount as too small and propose an amendment to raise the figure to $100 million. Thus θ_1 = $100 million. A vote is taken on the amendment, and 40 senators, mostly liberals, vote yea. Notwithstanding the failure of the amendment to receive a majority of votes, the roll call is useful information if accompanied with a score that purports to discriminate between members on issues such as the one under consideration. For social programs, scores of the Americans for Democratic Action (ADA), for example, are appropriate. Under assumption 1, the mean score of the 40 supportive senators, $\bar{s}(Y_1)$, is computed and paired with an ideal point equal to the value of the proposal, θ_1 = $100 million. Suppose the average score of yea voters is 75. The anchor, $A_1 = (75,100)$, therefore represents a mapping from 75 on the abstract horizontal axis (ADA scores) onto $100 million on the concrete vertical axis (appropriations), as shown in figure 1.

Now suppose that conservative senators, having spotted the weakness of the liberal coalition, respond with an alternative amendment below the $70 million reported by the Appropriations

Figure 1

Hypothetical Example of Anchors and Parameters



Committee. With the value of θ_2, the second proposal, equal to \$60 million and a record of votes for the proposal by members for whom the average ADA score is 25, the second anchor becomes another key point in the 2-dimensional space: $A_2 = (25,60)$.

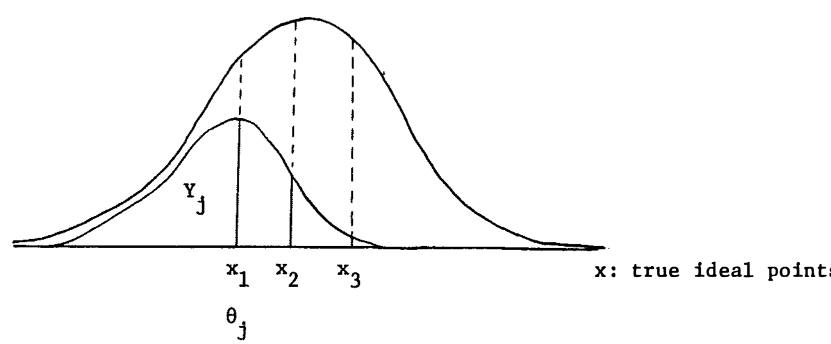
The next step is to estimate α and β which, in the case of two anchors, are simply the intercept and slope of a line passing through the points. Finally, the linearity assumption is invoked to estimate ideal points for each of the 100 Senators.[3] From the data shown in figure 1, the precise formula for the i'th Senator is:

$$\tilde{x}_i = \tilde{\alpha} + \tilde{\beta} * s_i$$
$$= 40 + .8 * \mathrm{ADA}_i.$$

Temporary adoption of a spatial perspective of voting helps to clarify the rationale underlying the technique. Suppose that the distribution of members' true ideal points on some concrete dimension is known to be the distribution in figure 2. Now consider the proposal, θ_j, and three specific members whose ideal points are x_1, x_2, and x_3. The interior region, Y_j, is a hypothetical but plausible frequency distribution of the ideal points of members who vote for the proposal. A comparison of the solid vertical lines (from ideal points on the horizontal axis to the top of the interior region) with dotted lines confirms the intuitive expectation that the nearer ideal points are to the proposal, the more likely members with such ideal points are to vote for the proposal. Most members with preferences such as member 1's will vote yea; almost all members with preferences such as member 3's will vote nay.[4]

Figure 2

Distribution of True Ideal Points
of Supporters and Nonsupporters of Proposal θ_j



The location of member 1's ideal point underscores the reasonableness of assumption 1, which subsequently provides leverage for the estimates of the ideal points. With the distribution of true ideal points of supporters of the proposal as shown, x_1 is exactly at the mean of the distribution. The resulting anchor is said to be accurate[5] because ultimately it leads to the correct association of the average score of yea voters, $\bar{s}(Y_j)$, with the value of the proposal, θ_j.

Of course, things may not always work out so nicely. Symmetric curves may be common and convenient, but they are not universal. Therefore, later we examine congressional situations in which anchors may be inaccurate and, consequently, where extra caution should be exercised. The next task, however, is to demonstrate the usefulness of the technique as a tool for testing hypotheses in a relatively "clean" legislative setting.

II. A CONGRESSIONAL APPLICATION

We demonstrate the potential of the technique by examining an issue of probable interest to readers: House authorizations for the National Science Foundation for fiscal year 1983. HR 5842 was reported by the Science and Technology Committee and came to the floor on May 19, 1982. It proposed authorization of $1.099 billion for NSF in the coming fiscal year. This amount was considerably greater than the authorization and appropriation in the previous fiscal year, and it was $30 million above the Reagan Administration's request.[6]

The bill came to the floor under an open rule (HR 459). The significance of the rule is that germane amendments were permitted. In a setting in which a sizeable increase in NSF funding was requested by the committee, and in which Republicans and Southern Democrats were striving to continue to exploit the budget cutting mood that was prevalent in the previous session of Congress, it is not surprising that amendments were indeed offered. Two such amendments serve as suitable proposals for computing anchors. The first is a motion by Representative Larry Winn (R-KS and ranking minority member of the Science and Technology Committee) to authorize $1.069 billion for NSF, thereby cutting $30 million from the committee bill and bringing the authorization precisely in line with the amount requested by the Office of Management and Budget. The Winn amendment passed narrowly, 194-191. Soon thereafter, an amendment in the form of a substitute was offered by Representative Peter Peyser (D-NY). Peyser's amendment called for the authorization of $1.089 billion -- $20 million more than the Winn proposal but $10 million less than the original proposal of the Science and Technology Committee. Peyser's amendment passed also, 203-188.

The situation can be represented straightforwardly on the concrete dimension of dollars. The first step is to select an appropriate score. Since the authorization in question pertained closely to federal funding of education and research, the score should reflect domestic liberalism and conservatism. The ratings of the League of Women Voters do just that and, accordingly, will be used throughout the remainder of the study.[7]

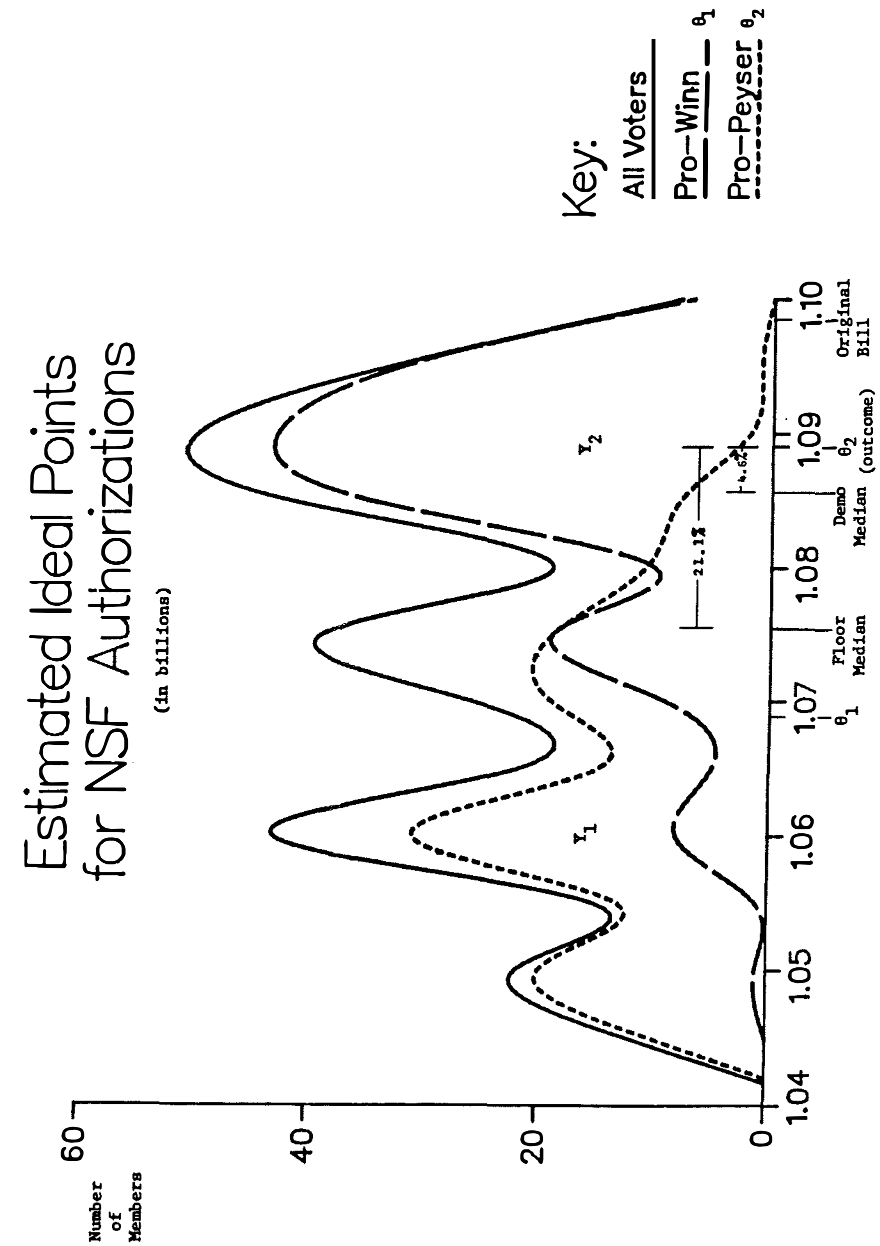
As described in section I, anchors are ordered pairs whose first value is the mean score of supporters of a proposal and second value is the concrete value of the proposal. The average LWV score of supporters of the Winn amendment is 40.4, while yea voters on the Peyser proposal have an average score of 72.2. Thus these values are associated with the dollar values (in billions) of the proposals -- 1.069 and 1.089. Next $\tilde{\alpha}$ and $\tilde{\beta}$ are computed, and individual ideal points are estimated according to the resulting linear equation:

$$\tilde{x}_i = 1.040 + .000619 * LWV_i$$

The distribution of estimates is shown in figure 3. Notice that the distributions of Winn and Peyser supporters, Y_1 and Y_2, approximate a key feature of the hypothetical distribution in figure 2: members whose (estimated) ideal points are near the value of the amendment are more likely to vote for it than are members whose ideal points are more distant. Furthermore, the distributions of supportive voters is reasonably symmetric, although necessarily somewhat lumpy due in part to the uneven underlying distribution of scores and in part to recoding the estimates in order to display the distributions.

The distribution of estimated ideal points of course does not confirm that the technique works, since by design the technique generates estimates that approximate figure 2. Thus evaluation of the technique must be based not on its estimates, which necessarily remain part of the maintained model, but instead on the usefulness of such

Figure 3



estimates to test hypotheses. Three such hypotheses will be considered — the committee deference norm, Black's theorem, and the majority median hypothesis -- after which other applications are discussed.

Committee deference. The institutionalization of the committee system in Congress is widely discussed and documented (Polsby, 1968; Shepsle, 1978, chapter 2; Haeberle, 1978). A concomitant, if not cause or effect, of institutionalization is deference accorded to a committee's legislation by noncommittee members when legislation reaches the floor. Fenno, for example, reported that about 90 percent of the Appropriation Committee's dollars-and-cents recommendations were accepted without change on the floor of the House (1966, p.450). If the deference norm is still prevalent, and prevalent even for nonexclusive committees such as Science and Technology, noncommittee members will generally accept committee legislation as it is reported. Amendments, if offered at all, will be minor or soundly defeated.

On the issue of NSF authorizations, members on the floor obviously did not, as a whole, defer to the Science and Technology Committee. Two nontrivial amendments were offered and each passed. Thus in this instance observations at the aggregate level alone sufficiently warrant rejection of the hypothesis. Were such rejection not so clear cut, however, -- and in many congressional situations it is not — estimates of individual ideal points would permit a more discriminating test. Specifically, the deference hypothesis suggests that members will oppose all major amendments, regardless of policy

content. Accordingly, if it were true, there should be no relationship between members' propensity to vote to amend committee versions of legislation and the distance between proposals and members' ideal points. Although it may appear that the deference hypothesis is testable using untransformed scores, the appearance is false. To obtain the necessary measures of distance, scores and proposals must be expressed in comparable units, which, of course, they typically are not.

The data in table 1 indisputably show that the propensity to oppose the Winn amendment is related to distance. Such is the case even for Democrats, who, as members of the majority party, presumably would be more inclined to defer uniformly to the committee's bill. In sum, the norm of deference is overwhelmed by policy preferences.

Black's theorem. In The Theory of Committees and Elections, Duncan Black demonstrated that under majority voting, members with single-peaked preferences voting sincerely on alternatives select the motion that the median voter prefers to all others. Although Black's theorem is old and well-known, its use in theories of congressional decision-making are relatively new. In spite of its applicability to some congressional settings, such as decisions by "sincere" committees or by the Committee of the Whole acting under the open (germaneness) rule in "simple jurisdictions" (Shepsle, 1979), the theorem has not been tested empirically because of the aforementioned obstacles. Having circumvented them, however, the technique renders the theorem testable. In its simplest form, the test merely requires

Table 1

The Committee Deference Hypothesis
(Winn Amendment)

Distance from Ideal point to Amendment (in millions)	Percentage of Voters Not Deferring to Committee		
	All Voters	Republicans	Democrats
10	3.7	33.3	2.6
20	31.7	76.9	19.1
30	59.2	80.0	44.8
40	77.9	91.3	50.0
50	85.5	100.0	50.0
60	83.3	100.0	50.0

identification of the median voter, estimation of his ideal point, and comparison of the ideal point, with the observed outcome. In the case of NSF authorizations, the 15 median voters' ideal points equal 1.076, which is not very close to the Peyser amendment, whose value is 1.089. Thus it would appear reasonable to reject this hypothesis also.

In some instances, such rejection may be too arbitrary. The difficulty in answering the question of "how close is close?" is that "not very close" in one setting (e.g., $13 million for NSF) indeed may be much closer in another (say, a defense authorization in which hundreds of billions of dollars are at stake). While it is impossible to escape exercising judgment, predictive closeness can be assessed somewhat less subjectively with a procedure analogous to classical hypothesis testing. Specifically, given the null hypothesis that the median voter's ideal point is not the outcome, and given that the median prediction is not likely to be perfect and hence some members' ideal points will lie between the median and the actual outcome, one may define *a priori* a cutoff point that specifies the minimum percentage of members whose ideal points may lie between these two points without calling for rejection of the hypothesis. Thus, if the percentage of such members is greater than or equal to the cutoff value, the null hypothesis would not be rejected, and implicitly the alternate hypothesis (the theorem) would be suspect. But if the percentage of such members is less than the cutoff point, the null hypothesis would be rejected and the theoretical prediction would be supported.

On the basis of a cutoff value of 10 percent, Black's theorem can be reconsidered more systematically. The percentage of members whose ideal points lie between the median voter and the actual outcome is 21.1 percent in the case of NSF authorizations, so the null hypothesis cannot be rejected: too many members' ideal points lie between the predicted and actual outcomes. Therefore, consistent with the earlier impressionistic assessment, Black's theorem is unsupported.

The majority median hypothesis. The final hypothesis is a hybrid of Black's theorem and the well-known notion of party government. Black's theorem, of course, does not discriminate between party members; members have ideal points and those points alone determine behavior, which, under the specified conditions, guarantees a median outcome. In contrast, a long line of congressional research has suggested that voting in Congress is affected by factors other than policy preferences. Two alternative classes of influence are party and institutional features. Standing committees, such as Science and Technology, work with leaders of parties to determine what bills will be reported to the floor for consideration. And the Rules Committee works with party and committee leaders to determine how bills may be changed, including occasional precise specification of proposals that may be offered as amendments (Bach, 1981). Although formal theoretical predictions of outcomes resulting from such activities are rare or nonexistent, a closely related observation is that party leaders are often moderates within their parties. Poole and Smith's (1983) multidimensional unfolding technique, for example, reveals of

the Senate

> . . . the close correspondence over the three year period [1979-1981] between the location of each type of leader and the median locations of their respective parties. . . . [L]eaders appear to be interested in formulating motions that reflect the mainstream position of their parties rather than the Senate as a whole. (pp. 15-16)

This finding is suggestive but not readily applicable to specific issues on concrete policy dimensions. However, with estimates of ideal points, a natural extension of the Poole-Smith observation can be examined, namely, the hypothesis that outcomes will be near the position of the median voter of the majority party.

The test is similar to that for Black's theorem. The majority median is 1.085, and the actual outcome (the Peyser amendment) is 1.089. Inspection of the frequency distribution of estimated ideal points reveals that only 4.6% of the estimated ideal points lie between the predicted and observed outcomes. In accordance with the procedure described above, the null hypothesis that outcomes will not be the majority party medians is rejected. The alternative, majority median hypothesis is therefore corroborated.

The foregoing demonstration of the hypothesis testing capabilities of the technique is illustrative but not exhaustive. Other applications include the following topics, which usually are addressed only theoretically or anecdotally. Estimation of ideal points would seem to pave the way for more systematic empirical tests of the relevant and sometimes competing theories.

Amendment strategy. Where are amendments likely to be located and which are most likely to pass?[8]

Agenda construction. To what areas in the policy space do leaders and members of the Rules Committee restrict the set of permissible amendments, and to what degree do such proposals represent the preferences of members who are unable to participate directly in agenda construction?

Sophisticated voting. Given settings in which agendas are well-defined and in which members are well informed of their colleagues' preferences, do voters "misrepresent" their preferences at early stages of voting in order to secure a preferable outcome at later stages?

Sophistication of committees. To what extent do committee members strategically place their legislation, incorporating their expectations of floor activity (and rules governing amendments) into committee decision-making?

III. CAVEATS

Although the simplicity of the technique is indisputable and its scope of applicability is promising, its limitations should nevertheless be stressed. Two are obvious: some congressional issues cannot be represented on numerical dimensions (for example, abortion, school prayer, busing), and on other issues that can be represented numerically, attempts to amend legislation may not occur (for example, when noncommittee members defer to committees, or when leaders or Rules Committee members prohibit amendments). Of course, inability to use the technique cannot lead to faulty inference, but misapplication

might. Thus, it is appropriate to conclude with an examination of congressional situations in which the technique probably should not be used.

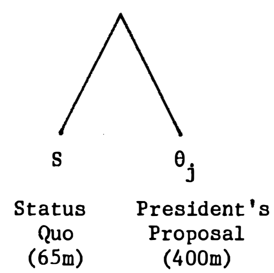
Constrained agendas with extreme proposals. Even the most noxious proposals muster up a few votes, and if such proposals are the only ones available for computing anchors, the anchors may be inaccurate. Consider a foreign policy situation in which a highly restrictive, closed rule agenda is in effect. Congress is to decide between the president's proposal for a $400 million in military aid for El Salvador versus the status quo level of $65 million.[9] The agenda is represented as a simple two-branch tree in figure 4a. If the distribution of true ideal points, x_i, is as depicted in 4b, and if only a few members vote for the president's proposal as shown by the small interior region, then the anchor will be inaccurate. Specifically, it pairs the mean score of the members in the shaded region, $\bar{s}(Y_j)$, with the value of the proposal $\theta_j = 400$, when in fact $\bar{s}(Y_j)$ should be paired with $\bar{x}(Y_j) = 225$, the average of true ideal points of voters for θ_j. (The bias in the estimates, $\tilde{x}_i$, that results from inaccurate anchors is defined and illustrated in the next example.)

While illuminating, such situations are not likely to arise in a legislative body that prides itself on considering the proposals its members want to consider. Closed rules are increasingly rare, even on matters such as taxation which traditionally have been regarded as privileged (Rudder, 1977). Moreover, Congress is not likely to have

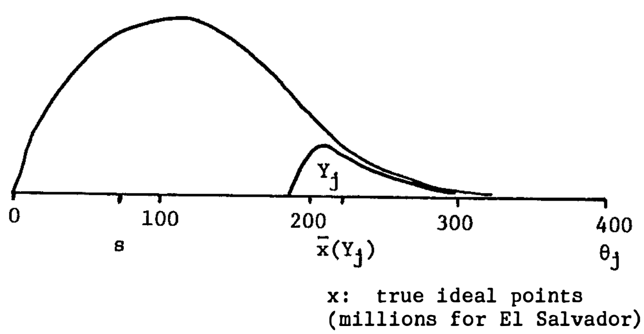
Figure 4

An Inaccurate Anchor
from a Constrained Agenda

a. Agenda



b. Inaccurate Anchor, $A_j = (\bar{s}(Y_j), 400)$



its agenda dictated by the president — not even in foreign policy matters.[10] Nevertheless, the possibility of inaccurate anchors is worth noting, and proposals should be selected with attentiveness to the freedom with which members may offer amendments and to the reasonableness of proposals under closed or modified-closed rules.

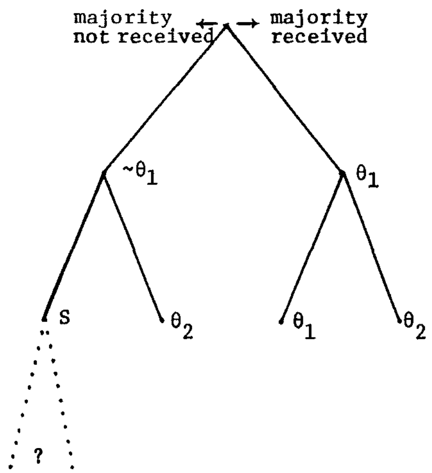
Unevenly distributed expectations about future, unknown proposals. In the case just discussed, members faced a highly constrained agenda and hence had no opportunity to vote for proposals widely perceived as acceptable. The contrasting situation is one in which the members are offered a choice among a larger set of alternatives, and in which one such alternative is, in effect, a future but unknown agenda. Such an agenda is illustrated in figure 5a, and is patterned after a rule that governed debate on the fiscal 1983 budget resolution in the House.[11] Members were to vote first on a Republican substitute to the resolution of the Budget Committee θ_1 and then on the Budget Committee's original proposal θ_2. The "king on the mountain" rule specified that the last proposal to receive a majority would be the winner. If neither received a majority, however, the status quo would remain in effect — i.e., there would be no resolution unless and until the Budget Committee reconvened and decided to report a resolution to the floor again. Thus uncertainty accompanies the tentative status quo outcome, S.

To illustrate the possibility of inaccurate anchors and biased estimates of ideal points[12] in such situations, we assume that the alternatives on the given agenda can be represented on a single

Figure 5

Bias From an Agenda with Uncertainty

a. Agenda



KEY

Rule: Vote on θ_1; Vote on θ_2;
Last to receive majority wins.

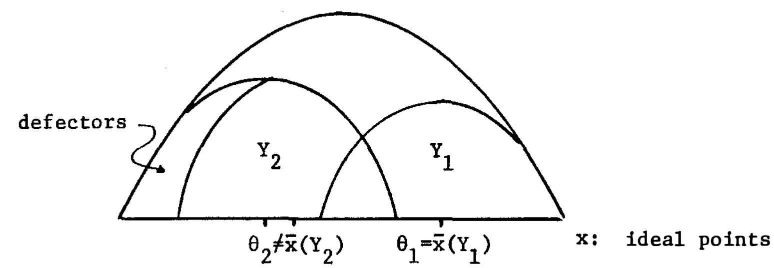
θ_1 : Republican Substitute

θ_2 : Budget Committee Resolution

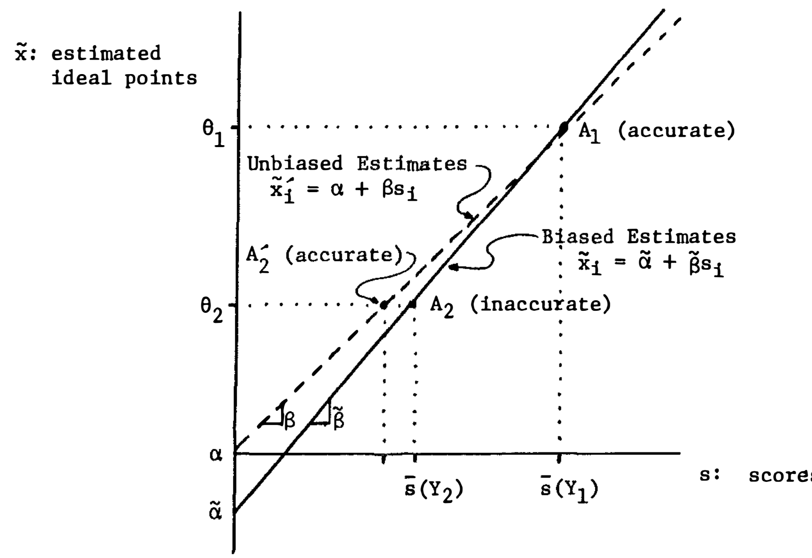
S : Status Quo or a future, unknown resolution.

Figure 5 (cont.)

b. True Ideal Points and Votes



c. Biased and Unbiased Estimates



dimension, even though the budget resolution on which the example is patterned fails to conform to this view. On the vote for the Republican substitute, θ_1, the distribution of supporters is symmetric (see figure 5b), so $\bar{x}(Y_1) = \theta_1$. Thus the anchor, A_1 in figure 5c, accurately pairs the mean score of supporters, $\bar{s}(Y_1)$, with the value of the proposal, θ_1.

However, if the proposal fails (as indeed the Republican substitute did), the rule states that the second vote is a choice between the committee's resolution, θ_2 and the status quo, S, the latter of which is plagued with uncertainty. If during the vote between S and θ_2, a homogeneous and nonmoderate group defects from the otherwise symmetric supporting coalition, then the mean ideal point supporters, $\bar{x}(Y_2)$, will necessarily move toward the nondefecting tail of the distribution as will the mean score $\bar{s}(Y_2)$, in figure 5c. Thus, the anchor point, A_2, is inaccurate, and subsequent estimates of ideal points will be biased, with the degree of bias increasing for members with extreme scores as illustrated by the lines in 5c.

Such situations may arise when members of one faction, say liberals, harbor expectations about future alternatives significantly different from their colleagues' expectations. In this example, liberal Democrats apparently expected that recommital would ultimately lead to a more liberal resolution. If in contrast expectations and uncertainty were more evenly distributed — in effect making a symmetric distribution of supporters for alternatives -- then defections would be balanced, anchors would be accurate and, finally,

estimates would be unbiased.

Nonuniformly distributed sophistication. A final potentially confounding influence is closely related to the possibility of systematically different expectations, namely, systematically differing exercises of sophistication. If the formal agenda is well-defined and members can easily identify sophisticated voting strategies but are somehow constrained from employing them,[13] then the same kind of bias as that shown in figure 5c may occur if sophisticated voters within the set of supporters of motions are not symmetrically distributed.

In general, anchors will be inaccurate whenever the true ideal points of the set of supporters make up a distribution whose mean is not centrally located — i.e., a distribution that is not symmetric. Unfortunately, straightforward tests for inaccuracy do not exist whereas the true ideal points are unobservable. The only recourse is to consider carefully the legislative situation at hand in order to judge the appropriateness of the technique. In the case of NSF authorizations, a careful reading of the _Congressional Record_ and of _Congressional Quarterly_'s account of the decision reveals no suggestion that confounding conditions exist, but legislative situations often are more complex. Thus McCrone's warning in his study of voting strategies is equally relevant for estimation of ideal points: "there is no substitute for informed use of roll call data" (1977, p. 181).

IV. SUMMARY

The technique appears well-suited for testing hypotheses about aggregate outcomes in relatively simple legislative settings. With respect to authorizations for the National Science Foundation for fiscal year 1983, the policy proposals, agenda, and legislative strategies were sufficiently tidy to permit straightforward tests of three hypotheses. We found no support for the deference hypothesis, little support for Black's theorem, and moderate support for the majority median hypothesis.

The principal point, however, pertains not to NSF authorizations but rather to future research. Specifically, the demonstration suggests that more systematic applications of the technique will advance the study of legislative behavior beyond mere searches for empirical regularities at the individual level, to tests of micro-level theories that predict aggregate outcomes.

FOOTNOTES

1. Major earlier works include MacRae (1958, 1970), Kingdon (1973), Clausen (1973), and Jackson (1974). See also Weisberg's (1972) comparative discussion of proximity and Guttman scaling, McCrone's (1977) application of Guttman scaling, Enelow's (1981) use of ADA scores to identify a form of sophisticated voting, Poole and various colleagues' ongoing research employing multidimensional unfolding techniques (1981-1983), and several analyses of alignments and voting change over time, including Sinclair (1977), Asher and Weisberg (1978), and Smith (1981).

2. Throughout the paper the "scores" to which we refer are interest groups' ratings of MCs. Whereas such ratings are frequently and perhaps justifiably criticized, we hasten to stress that the technique can be applied using other scores that are more complex functions of votes than are interest group ratings. Bear in mind, however, that any such scores carry with them additional assumptions, such as cardinality, linearity, sincere voting, etc.

3. With more than two anchors, and hence degrees of freedom, the parameters could be estimated with a simple regression. Similarly, linear estimation is not required although theoretical and empirical guidance for alternative functional forms is scanty.

4. Although the location of the status quo can be important in

actual settings (Romer and Rosenthal, 1978), we defer its discussion to section III.

5. Formally, A_j is <u>accurate</u> if $\bar{x}(Y_j) = \theta_j$, where $\bar{x}(Y_j)$ is the average true ideal point of members voting yea on θ_j.

6. The bill also contained a provision for authorization of funds for fiscal 1982. Its inclusion, however, was <u>pro forma</u>, and the value of the 1982 provision remained constant and inspired no objections in the course of the debate and amendment process. See the <u>Congressional Record of the Proceedings and Debates of the 97th Congress, Second Session</u>, May 19, 1982, pp. 2310-2330.

7. Other scores such as ADA, ACA and COPE, are similarly defensible. However, a review of the roll call votes on which such scores were based for the 1982 session suggested that LWV scores were more focused on domestic issues. The results were compared with estimates using ADA scores, and differences were minor.

8. The NSF case suggests a couple of possibilities. The Democratic amendment (1.089) was near the Democratic median (1.085); the Republican amendment (1.069) was farther from, and more moderate than, the Republican median (1.062) -- perhaps strategically placed to attract Democratic votes needed for passage.

9. See "Massive Arms Aid Drafted for Salvador", <u>Los Angeles Times</u>, January 10, 1984, p. 1.

10. Amendments were permitted when the appropriations measure reached the floor of the House (and likewise in the Senate). The intermediate result was appropriation of $126 million, which was later increased to the final level of $196.5 million after Duarte visited Congress and Reagan moderated his initial $400 million request to $243 million.

11. See the <u>Congressional Quarterly Almanac</u>, 1982, pp. 192-193.

12. An estimated ideal point, $\tilde{x}_i$, is <u>biased</u> if $E(\tilde{x}_i) \neq x_i$. The relationship between accuracy of anchors (see footnote 5, supra) and bias of ideal point estimates will soon become clear.

13. See for example, Denzau, Riker and Shepsle, 1984.

REFERENCES

Asher, H. B. and Weisberg, H. F. 1978. Voting Change in Congress. American Journal of Political Science. 22:391-425 (May)

Bach, S. 1981. Special Rules in the House of Representatives: Themes and Contemporary Variations. Congressional Studies. 8:37-58

Black, D. 1958. The Theory of Committees and Elections. London: Cambridge University Press.

____________ and Newing, R. A. 1951. Committee Decisions with Complementary Valuation. London: Hodge.

Clausen, A. 1973. How Congressmen Decide: A Policy Focus. New York: St. Martin's Press.

Denzau, A. T. and Mackay, R. J. 1983. Gatekeeping and Monopoly Power of Committees: An Analysis of Sincere and Sophisticated Behavior. American Journal of Political Science. 27:740-61.

Denzau, A. T., Riker, W. H. and Shepsle, K. A. 1984. Strategic Behavior in the Theory of Legislatures. Unpublished manuscript.

Enelow, J. M. 1981. Saving Amendments, Killer Amendments, and an Expected Utility Theory of Sophisticated Voting. Journal of Politics. 43:1062-89.

Fenno, R. F. 1966. The Power of the Purse: Appropriations Politics in Congress. Boston: Little, Brown.

Fowler, L. L. 1982. How Interest Groups Select Issues for Rating Voting Records of Members of the U. S. Congress. Legislative Studies Quarterly. 3:401-14.

Haeberle, S.H. 1978. The Institutionalization of the Subcommittee in the U.S. House of Representatives. Journal of Politics. 40:1054-65.

Jackson, J. E. 1974. Constituencies and Leaders in Congress. Cambridge: Harvard University Press.

Kingdon, J. W. 1977. Models of Legislative Voting. Journal of Politics. 39:563-95 (August)

____________. 1973. Congressmen's Voting Decisions. New York: Harper and Row.

Krehbiel, K. 1983. Decentralization, Representativeness and Congressional Reform. Ph.D. dissertation, University of Rochester, Department of Political Science.

MacRae, D. 1958. Dimensions of Congressional Voting: A Statistical Study of the House of Representatives in the Eighty-first Congress. Berkeley: University of California Press.

____________. 1970. Issues and Parties in Legislative Voting: Methods of Statistical Analysis. New York: Harper and Row.

McCrone, D. J. 1977. Identifying Voting Strategies from Roll Call Votes: A Method and an Application. Legislative Studies Quarterly. 2:177-191 (May).

Polsby, N. W. 1968. The Institutionalization of the U. S. House of Representatives. American Political Science Review. 62:148-68.

Poole, K. T. 1981. Dimensions of Interest Group Evaluation of the U.S. Senate, 1969-1978. American Journal of Political Science. 25:49-67 (February).

____________ and Smith, R. 1983. Ideology and Strategy in the Formulation of Legislative Alternatives. Presented at the Annual Meeting of the American Political Science Association.

____________ and Rosenthal, H. 1983. A Spatial Model for Legislative Roll Call Analysis. Working Paper no. 487. California Institute of Technology.

Romer, T. and Rosenthal, H. 1978. Political Resource Allocation, Controlled Agendas, and the Status Quo. Public Choice. 33:27-43.

Rudder, C. 1977. Committee Reform and the Revenue Process. In Congress Reconsidered, ed. L. C. Dodd and B. I. Oppenheimer. Washington: Congressional Quarterly Press.

Shepsle, K. A. 1979. Institutional Arrangements and Equilibrium in Multidimensional Voting Models. American Journal of Political Science. 23:27-60.

____________. 1978. The Giant Jigsaw Puzzle. Chicago: University of Chicago Press.

Sinclair, B. D. 1977. Party Realignment and the Transformation of the Political Agenda. American Political Science Review. 71:940-53 (September).

Smith, S. S. 1981. The Consistency and Ideological Structure of U. S. Senate Voting Alignments, 1957-1976. American Journal of Political Science. 25:780-795 (November).

Weisberg, H. F. 1972. Scaling Models for Legislative Roll-Call Analysis. American Political Science Review. 66:1306-15.